

BOOK REVIEW

The North American Grasshoppers. Volume I. Acrididae: Gomphocerinae and Acridinae.—Daniel Otte. 1981. Harvard University Press, Cambridge, Massachusetts. 275 pp. \$45.00.

This book is the first volume of a projected three-volume work, the principal purpose of which, according to its author, is "to aid in identifying all described grasshopper species north of the Gulf of Panama, as well as those in the West Indies". It deals with two subfamilies of the family Acrididae, the Gomphocerinae and Acridinae, which together comprise those grasshoppers best fitted to bear the name by virtue of the grassy habitats frequented by most of the species. Throughout, the term "grasshopper" is taken to mean the "short-horned" grasshoppers of the orthopteran suborder Caelifera.

Taxonomic monographs tend to take one of two forms: the monographic revision and the handbook. The first aims to be a comprehensive, archival documentation, to be used by, and written in the language of, the specialist researcher who may wish to carry investigation further in the particular field. The second is intended as an identification manual and source of interesting information for a variety of non-specialist readers. Daniel Otte has written a book which falls between these two extremes, or rather displays some of the characteristics of both. By employing a variety of novel and ingenious devices, he has succeeded in meeting many of the requirements of both groups of readers in a very pleasing format.

He starts with a general introduction in which mating behaviour, sound production, and problems of identification of grasshoppers in general are emphasised and structural details illustrated by clear and well labelled drawings. Then follow an illustrated key to the families of North American grasshoppers, an itemised diagnostic characterisation of the North American acridid subfamilies that lack a prosternal spine, i.e., the Gomphocerinae, Acridinae, and Oedipodinae, a general discussion of the Gomphocerinae and Acridinae, and an illustrated key to their component genera.

The greater part of the book is then devoted to a systematic account of the 42 genera and 124 species of Gomphocerinae and two genera and three species of Acridinae recognised by Otte. The gomphocerine genera are arranged in 16 "genus groups", which in two instances receive also tribal names. The criteria used for distinguishing the categories genus group and tribe, and their ranking relationship, are not stated. Under each genus group containing more than one genus an itemised diagnosis of the component genera is given, headed "Identification of Genera". Each genus is then taken up in turn, with sections on "Recognition", "Identification of Species" (itemised diagnosis), and sometimes a key to the species. There follows individual

treatment of each species, typically under the headings Distribution, Recognition, Habitat, Life Cycle, and References, often with text figures, and including an excellent distribution map on a base of state boundaries, omitting confusing topographic detail.

A major feature of the book is the 16 plates illustrating each species in colour, often including both sexes and sometimes, in variable species, more than one presentation to show the more distinctive of the alternative patterns. This takes care of a rather general objection to coloured illustrations—that they lead the reader to expect close conformity to the published figure, whereas there may be wide divergence from it amongst individuals. However, it has been represented to me that the colours in many cases are too weak. Another interesting feature of both the plates and some of the line drawings in the text is the presentation in dorsolateral view. This has the advantage of giving an impression of both the dorsal and lateral characteristics in a single drawing, although for precise comparisons it cannot replace separate dorsal and lateral views, especially since it is hardly possible to maintain exactly the same orientation from drawing to drawing. The technique is feasible only in the hands of a skilled illustrator, such as Otte obviously is, and is most appropriate for the less specialised reader.

Four valuable appendices enable the author to separate from the systematic treatment in the main part of the book those formal but essential details concerning synonymy and type species of genera, and synonymy, generic assignment, and type-specimen identity and location in species, which concern principally the research specialist. They list also taxonomic changes made for the first time in the book and the divergent subfamily assignments of certain genera by the principal world monographers of recent years. The justification for a number of new synonymies is not argued. Appendix 5, on the pronunciation of generic names is, as the author admits, more controversial, but may assist students. The book is completed by a glossary, a list of references, and a taxonomic index.

I have some difficulty in interpreting the information given at the generic level. The genus *Ligurotettix* will serve as an example chosen at random. On p. 146 under "Identification of Genera" of the *Cibolacris* genus group, four attributes of *Ligurotettix* are given. On p. 156, under "Recognition" of the genus, several more are listed, but only one of the earlier four is represented. Presumably some difference is seen between "identification" and "recognition", but what is it? We are not told. There is now virtually no disagreement that *species* should be treated as concrete populations whose members are determined by relations of reproductive compatibility and incompatibility. In the case of *genera* there are no such biological criteria, although some would claim that "evolutionary" criteria are operational. Important though the type species is in a nomenclatural context, it tells us

what species must not be excluded from the genus, not which species should be included. The latter is approached nowadays with the aid of some form of clustering procedure. Having obtained a more or less discrete cluster, we search for attributes, common to all the species but not to related genera, which would be jointly or severally diagnostic, and our success in this enterprise may determine how far we adhere to the clustering pattern in building up a practical classification. But not every feature in common need be regarded as "necessary" to membership of the genus and is unlikely to be "sufficient." This situation has given rise to the distinction between diagnosis and description of a genus. The diagnosis is a listing of those attributes which, in the view of the taxonomist, would need to be possessed by any species being considered for membership, and which at the same time differentiate the genus from its near relatives. The description is a statement of the attributes common to all the species and, if desired, of the range of interspecific variation in other characters. The diagnosis is a characterisation of the pigeon-hole, the description a characterisation of the present contents. The distinction becomes of special importance in monotypic genera, where the generic diagnosis must be carefully worked out so as not to incorporate specific attributes that would be unlikely to be considered necessary in some newly discovered candidate for membership of the genus. I do not believe that this distinction corresponds to Otte's "identification" and "recognition", both of which seem to combine elements of both diagnosis and description, though leaning more towards the second.

Similar uncertainties are encountered at the subfamily level. Nearly all the genera are endemic to the region, but this is not true of the subfamilies. It must be understood, and was certainly in the mind of the author, that the characterisations and keys will not necessarily work on a world basis. Otte's comments on problems of subfamily classification in the Gomphocerinae and Acridinae, while familiar outside the subject area, are well supported by his discussion on p. 17. However, the problem is not simply where to place individual genera: it extends to the question of whether the two taxa merit separation at subfamily level. Moreover, the same question arises with respect to the subfamily distinctness of the Acridinae and Oedipodinae concerning which, along with the *ad hoc* Truxalinae (extralimital), controversy and vacillation involving Dirsh and Uvarov continued for years. The case of *Stethophyma*, discussed on p. 208 (see also pp. 17 and 34) illustrates the situation very well. This genus not only lacks the principal diagnostic feature of the Gomphocerinae (the femoral pegs), but it possesses the principal feature of the Oedipodinae (the intercalary vein); yet Otte tentatively places it in the Gomphocerinae because of its "behaviour and appearance".

It is a tribute to the publishers that my (admittedly not completely exhaustive) reading of this book has not brought to light a single printing error.

However, attention may be directed to a few minor departures from accepted terminology and to a few minor factual errors. In Figure 5, on p. 7, the scape of the antenna and the flagellum are shown and labelled, but not the pedicel, and in the glossary, p. 253, it is incorrectly stated that the flagellum is the "main portion of the antennae excluding the basal segment or scape". In Figure 8, p. 9, the terminology of the areas and carinae of the hind femur is unconventional and will not be readily understandable to the specialist; the conventional terminology can be found in many readily available works, including those of Rehn, Dirsh, and Uvarov. In Figure 6, p. 8, the structure labelled "preocular ridge" is conventionally termed the "lateral facial carina"; the "lateral foveolae" are the "temporal foveolae" (see also p. 253). On p. 254, the definitions of "sternum" and "sternite" are misleading. A sternum is the *ventral part* of a body segment; a sternite is a sclerotised plate occupying the whole or part of a sternum; since in Acrididae the whole of each sternum is sclerotised, the two terms are interchangeable (the same applies to "tergum", "tergite"). Also on p. 254, under "Subgenital plate": The term is applied in both sexes. In the female it is the eighth sternum (or sternite), in the male the "ninth sternal lobe", which articulates on the main part of the sternum. In the "Key to North American Orthopteroid Insects", the Acridoidea are shown as having a tympanum, whereas on p. 9 it is correctly stated that the tympanum may be absent. On p. 253, under "Paratype": According to the Glossary of the International Code of Zoological Nomenclature, a paratype is "every specimen in a type-series other than the holotype"; according to Article 72(b) of the Code, a type-series of a species "consists of *all* the specimens on which its author bases the species, *except* any that he refers to as variants, or doubtfully associates with the nominal species, or expressly excludes from it"—i.e., the author does not have to specifically "designate" a paratype. On p. 215, under (1), for "tibiae" read "femora"—a *lapsus calami*. On p. 208 the question of the type species of *Stethophyma* and *Mecostethus* is presented as though it were open to Otte to make his own decisions, whereas the valid type species must be determinable under the provisions of the International Code or by ruling of the International Commission on Zoological Nomenclature.

In summary, Dr. Otte has produced a useful, attractive, and very readable account of the two subfamilies he deals with. The few minor blemishes should be avoidable in the second and third volumes and in any new edition.—K. H. L. Key, *Division of Entomology, C.S.I.R.O., Canberra, Australia*.